Modular LAN Campus Core Switch				
ID	**Ref. No.**	**Primary Attribute**	**Secondary Attribute**	**Specification**
1	1	Chassis	Type	Modular
	2		19 Inch Rack Mounting	Required
	3		Packet Processor Redundancy	Required (Online Insertion/Removal)
	4		Packet Processor	Layer-3 Switching: Non-Blocking Layer-2 Switching: Non-Blocking
	5		Control Plane Redundancy Support	Required
	6		Cooling Redundancy Support	Required
	7		Power Supply Redundancy Support (1:1)or (N+1)	Required
	8		Input Power Options	AC
	9		Online Insertion/Removal Hot-Pluggable	Required
	10		Multi-Chassis Link Aggregation	Required
2	1	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
	2		Layer 3 Protocols & Routing Features	- IPv4, IPv6,ICMP,OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Routing Engine Fast failover - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
	3		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
	4		BGPv4 Requirements	- Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	5		Required L2 Features	802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes

	6		Port Security	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port
	7		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling - 15,000 source and 15,000 destination QoS ACL entries (processed in hardware)
	8		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN - 15,000 source and 15,000 destination ACL entries (processed in hardware)
	9		NTP Support	- Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
	10		Unidirectional Link failure Detection	Required
	11		802.1d Required Spanning Tree Features	- Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU

	12		Network Management	- Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
	13		SNMP Features	- Support for, SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
	14		Port Mirroring or similar	Required
	15		Remote Port Mirroring or similar	Required
	16		Configuration File Management	TFTP, FTP
	17		Software Image Management	TFTP, FTP
	18		VLAN Support	>= 1000 VLAN's
	19		Data Traffic Rate Limiting	- Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
	20		VOIP Features	Configurable Voice-VLAN
	21		Message Logging Buffer	- Configurable log history size - Configurable logging severity - Configurable log message time stamps
3	1	Line-cards / Port Interfaces	Throughput to Backplane	Non-Blocking option available
	2		Port per ASIC (Oversubscription)	1:1 Option Available
	3		Interface Speed Options	- 10/100 Mbps Ethernet - 10/100/1000 Mbps Ethernet - 1 Gbps Ethernet - 10 Gbps Ethernet
	4		Media Flexibility Options	MMF >= 220m, SMF >= 10km, IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX , 100Base-TX (RJ45), 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 1000BASE-T
	5		Configurable Egress Queues	>= 8 per port including Strict Priority
	6		Power over Ethernet Options	- 802.3af (full power on all ports) - 802.3at (full power on all ports) - Configurable Power levels per port - Visibility into PoE power use
	7		Online Insertion/Removal Support	Required

High Density Modular LAN Access Switch				
ID	**Ref. No.**	**Primary Attribute**	**Secondary Attribute**	**Specification**
1	1	Chassis	Type	Modular
	2		19 Inch Rack Mounting	Required
	3		User Access Port Count	=> 144 copper or fiber
	4		System Throughput	Non-Blocking
	5		Packet Processor Redundancy	High Availability (critical areas): Required (Online Insertion/Removal) Non-Critical Areas: Not Required
	6		Packet Processor	Layer-3 Switching: Non-Blocking Layer-2 Switching: Non-Blocking
	7		Control Plane Redundancy Support	High Availability (critical areas): Required Non-Critical Areas: Not Required
	8		Cooling Redundancy Support	Required
	9		Power Supply Redundancy Support (1:1)or (N+1)	Required
	10		Input Power Options	AC
	11		Online Insertion/Removal Hot-Pluggable	Required
2	1	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
	2		Hot Swappable Insertion / Removal Support	Required
	3		Layer 3 Protocols & Routing Features	- IPv4, IPv6,ICMP,OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
	4		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
	5		BGPv4 Requirements	- Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities

	6		Required L2 Features	802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes
	7		Port Security	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port
	8		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
	9		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	10		NTP Support	- Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
	11		Unidirectional Link Failure Detection	Required
	12		802.1d Required Spanning Tree Features	- Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. -Ability to configure STP edge ports to disable upon receiving a BPDU

	13		Network Management	- Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
	14		SNMP Features	- Support for, SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager -Support for multiple RO and RW community strings -Support for multiple SNMP profiles
	15		Port Mirroring or Similar	Required
	16		Remote Port Mirroring or Similar	Required
	17		Configuration File Management	TFTP, FTP
	18		Software Image Management	TFTP, FTP
	19		VLAN Support	>= 1000 VLAN's
	20		Data Traffic Rate Limiting	- Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
	21		VOIP Features	Configurable Voice-VLAN
	22		Message Logging Buffer	- Configurable log history size - Configurable logging severity - Configurable log message time stamps
3	1	Linecards / Port Interfaces	Throughput to Backplane	Non-Blocking option available
	2		Port per ASIC (Oversubscription)	1:1 Available option required
	3		Access Port Speed Options	- 10/100 Mbps Ethernet - 10/100/1000 Mbps Ethernet - 1 Gbps Ethernet (SFP)
	4		Uplink Port Speed Options	>= Qty 2 - 1 Gbps or 10 Gbps
	5		Media Flexibility Support	MMF >= 220m, SMF >= 10km, IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX , 100Base-TX (RJ45), 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 1000BASE-T
	6		Configurable Egress Queues	>= 8 per port including Strict Priority
	7		Power over Ethernet Options	- 802.3af support (full power on all ports) - 802.3at support (full power on all ports) - Configurable Power levels per port - Visibility into PoE power use
	8		Online Insertion/Removal Support	Required

Stackable Network Access Switch				
ID	**Ref. No.**	**Primary Attribute**	**Secondary Attribute**	**Specification**
1	1	Chassis	Type	Fixed Configuration
	2		19 Inch Rack Mounting	Required
	3		Stacking Support for Multiple Switches	- Backplane (no user or uplink ports used to stack) - Single control-plane - Single data-plane - Non-Blocking optional
	4		Power Input Options	AC
	5		Redundant Power Option (1:1)	Optional High Availability Option: Required Non-Critical Option: Not Required
2	1	Packet Processor	Layer 2 Switching	Non-Blocking
	2		Layer 3 Switching	Non-Blocking
	3		IGMP Snooping & IPv6 MLD v1 & v2	Switched in Hardware
	4		MAC Addresses Per Switch	>=12000
3	1	Port Interfaces	Access Port Options	- 10/100 Mbps - 10/100/1000 Mbps - 1 Gbps Ethernet (SFP)
	2		Uplink Port Options	=> Qty 2 - 1 Gbps or 2 - 10 Gbps copper or fiber
	3		Per Switch Port Count Options	- 12 Port Option - 24 Port Option - 48 Port Option
	4		SFP Media Flexibility Options	IEEE 802.3z-compliant 1000BASE-SX, 1000BASE-LX/LH, 1000BASE-T (RJ45), 100Base-T(RJ45), 10GBASE-SR, 10GBASE-LR
	5		Power over Ethernet Options	- 802.3af support (24 port & 48 port options, capable of supplying power to all ports) - 802.3at support (24 port & 48 port options) - Configurable power levels per port - Visibility into PoE power use
	6		Configurable Egress Queues	=> 8 per port including Strict Priority
4	1	Operating System	Layer 3 Protocols & Features	- IPv4, IPv6,ICMP,OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2

	2		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
	3		BGPv4 Requirements	- Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	4		Required L2 Features	802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes
	5		Port Security	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port
	6		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling

	7		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	8		NTP Support	- Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
	9		Unidirectional Link failure detection	Required
	10		802.1d Required Spanning Tree Features	- Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. -Ability to configure STP edge ports to disable upon receiving a BPDU
	11		Network Management	- Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
	12		Multi-chassis Management Interface Aggregation	Required
	13		Cross-Stack Link Aggregation	Required: must be capable to support defining link aggregation across multiple switches within a stack

	14		SNMP Features	- Support for SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. - Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
	15		Port Mirroring or similar	Required
	16		Remote Port Mirroring or similar	Required
	17		Software Image Management	TFTP, FTP
	18		Configuration File Management	TFTP, FTP
	19		VLAN Support	>= 255 VLAN's >= 1000 VLAN ID's
	20		Data Traffic Rate Limiting	- Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
	21		VOIP Features	Configurable Voice-VLAN
	22		Message Logging Buffer	- Configurable log history size - Configurable logging severity - Configurable log message time stamps

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

Modular LAN Campus Core Switch - Configuration				
ID	**Ref. No.**	**Primary Attribute**	**Secondary Attribute**	**Specification**
1	1	Chassis	Type	Modular
	2		19 Inch Rack Mounting	Required
	3		Redundant Switch Packet Processor	Required (Online Insertion/Removal)
	4		Packet Processor	Required
	5		Control Plane Redundancy Support	Required
	6		Cooling Redundancy Support	Required
	7		Power Supply Redundancy Support (1:1)or (N+1)	Required
	8		Input Power Options	AC Required
	9		Online Insertion/Removal Hot-Swappable	Required
	10		Multi-Chassis Link Aggregation Support	Required
2	1	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
	2		Layer 3 Protocols & Routing Features	- IPv4, IPv6,ICMP,OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Routing Engine Fast failover - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
	3		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
	4		BGPv4 Requirements	- Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	5		Required L2 Features	802.1q, Per-port broadcast, multicast, and unicast storm control, 802.3ad (LACP), Link-Layer Discover Protocol, Jumbo Ethernet Frames with MTU up to 9000 bytes

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

	6		Port Security Requirements	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port
	7		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
	8		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	9		NTP Support	- Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
	10		Unidirectional Link failure Detection	Required
	11		802.1d Required Spanning Tree Features	- Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

	12		Network Management	- Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port -Optional - DNS support for resolution of user-defined device names
	13		SNMP	- Support for, SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
	14		Port Mirroring or similar	Required
	15		Remote Port Mirroring or similar	Required
	16		Configuration File Management	TFTP, FTP
	17		Software Image Management	TFTP, FTP
3	1	Line-cards / Port Interfaces	Online Insertion/Removal Support	Required
	2		Connection to Switch Fabric	=< 2:1 oversubscription
	3		Configurable Egress Queues	>= 8 per port including Strict Priority
	4		1 GbE Fiber port count	Minimum 144 count 1 GbE Fiber Ports (100 SX Optics) (44 LX/LH Optics)
	5		100/1000 port count	Minimum (48) 100/1000 Copper RJ45 ports
	6		10 GigE Port count	Minimum (2) 10 GigE Ports

Configuration Item Addendum

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

High Density Modular LAN Access Switch - Configuration				
ID	**Ref. No.**	**Primary Attribute**	**Secondary Attribute**	**Specification**
1	1	Chassis	Type	Modular
	2		19 Inch Rack Mounting	Required
	3		System Throughput	Non-Blocking
	4		Packet Processor Redundancy	Required
	5		Packet Processor	Layer-3 Switching: Non-Blocking Layer-2 Switching: Non-Blocking
	6		Cooling Redundancy Support	Required
	7		Power Supply Redundancy Support (1:1)or (N+1)	Required
	8		Input Power Options	AC
	9		Online Insertion/Removal Hot-Pluggable Slot	Required
2	1	Operating System Features	Protocols switched in hardware	IPv4, IPv6, IGMP Snooping, IPv6 MLD v1 & v2
	2		Hot Swappable Insertion/Removal Support	Required
	3		Layer 3 Protocols & Routing Features	- IPv4, IPv6,ICMP,OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
	4		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
	5		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Aupport for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	6		Port Security	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port
	7		Unidirectional Link failure Detection	Required

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

	8		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby) (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps
	9		BGPv4 Requirements	- Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	10		Required L2 Protocols & Features	- 802.1q - Per-port broadcast, multicast, and unicast storm control - 802.3ad (LACP) - Link-Layer Discover Protocol - Jumbo Ethernet Frames with MTU up to 9000 bytes
	11		802.1d Spanning Tree Features Required	- Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per - port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU
	12		VOIP Features	Configurable Voice-VLAN

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

	13		Network Management	- Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or Similar - ability to disable telnet, ftp,HTTP, HTTPS - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management Port-optional - DNS support for resolution of user-defined device names
	14		SNMP	- Support for SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. - Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
	15		Message Logging Buffer	- Configurable log history size - Configurable logging severity - Configurable log message time stamps
	16		Port Mirroring or similar	Required
	17		Remote Port Mirroring or similar	Required
	18		Software Image Management	TFTP, FTP
	19		Configuration file Backup and Management	TFTP, FTP
	20		NTP Support	- Version 3 or greater Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
3	1	Linecards / Port Interfaces	Online Insertion/Removal	Required
	2		Connection to Switch Fabric	=< 2:1 oversubscription
	3		Configurable Egress Queues	>= 8 per port including Strict Priority
	4		Power over Ethernet Requirement	- 802.3af support (full power on all ports) - 802.3at support (full power on all ports) - Configurable Power levels per port - Visibility into PoE power use
	5		User Access Port Count	Minimum (240) ports of 100/1000 Copper RJ45

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

	6		Uplink Ports Required	Minimum (4) 1 GbE Fiber (LX/LH Optics)

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

Stackable Network Access Switch - Configuration				
ID	**Ref. No.**	**Primary Attribute**	**Secondary Attribute**	**Specification**
1	1	Chassis	Type	Fixed Configuration
	2		19 Inch Rack Mounting	Required
	3		Stacking Support for Multiple Switches	- Backplane (no user or uplink ports used to stack) - Single control-plane - Single data-plane - Non-Blocking optional
	4		Power Supply Redundancy (1:1 or n+1)	Required
	5		Power Input Options	AC
2	1	Packet Processor	Layer 2 Switching Throughput (pps)	Non-Blocking
	2		Layer 3 Switching Throughput (pps)	Non-Blocking
	3		IGMP Snooping & IPv6 MLD v1 & v2 in Hardware	Required
3	1	Port Interfaces	User Access Port Count	(48) Port 100/1000 RJ45 Copper
	2		Uplink Ports	(4) GbE Fiber ports (LX/LH Optics)
	3		Power over Ethernet Options	- 802.3af support (all 48 ports) - 802.3at support (all 48 ports) - Configurable power levels per port - Visibility into PoE power use
	4		Configurable Egress Queues	=> 8 per port including Strict Priority
4	1	Operating System	Layer 3 Protocols & Features	- Option for L3 Switching: IPv4, IPv6,ICMP, OSPF, BGP - Virtual Router Redundancy Protocol (VRRP) - Switching load sharing configurable per packet or per session, and per session is configuration with L3 address and L4 ports - Protocol Independent Multicast (PIM) v1 & v2
	2		OSPF Requirements	- IPv4 Open Shortest Path First (OSPF) versions 2 - IPv6 Open Shortest Path First (OSPF) versions 3 - MD5 authentication - Configurable areas, ABRS, and ASBRs - Configurable area types: normal (LSAs 1-5), stubby (LSAs 1-4), totally stubby (LSAs 1-2), Not-So-Stubby Area (NSSA) (LSAs 1-4 & 7), and NSSA totally stubby) (LSAs 1-2 & 7) - Configurable router ID - Configurable hello packet interval - Configurable router dead interval - Configurable priority for DR and BDR - Configurable per interface network types (P2P, broadcast, NBMA, and virtual links) - Configurable cost per interface - Configurable cost multiplier - Ability to redistribute static routes and other protocol routes using access lists and route maps

Note: This addendum represents one of the most complex variants and has been created for pricing purposes only.

	3		BGPv4 Requirements	- Multiprotocol Border Gateway Protocol (BGP) for IPv4 and IPv6 - MD5 authentication - Use all standard attributes - Ability to enable or disable synchronization - Configurable local preference per neighbor - Configurable multi-exit discriminator (MED) per neighbor - Configurable standard and extended communities
	4		Layer 2 Protocols & Features	- 802.1q - Per-port broadcast, multicast, and unicast storm control - 802.3ad (LACP) - Link-Layer Discover Protocol - Jumbo Ethernet Frames with MTU up to 9000 bytes
	5		Port Security	- 802.1x Support - MAC Authentication Bypass - Dynamic VLAN Assignment - Configurable number of MAC Addresses allowed per port - Configurable actions to take when violation occurs - Ability to configure MAC address or addresses allowed per port - Ability to learn and stick a MAC Address per port
	6		Software Image Update Options	TFTP, FTP
	7		Configuration File Backup and Management	TFTP, FTP
	8		QoS Features	- 802.1p class-of-service(CoS) classification - Differentiated Services Code Point (DSCP) classification - Support ingress classification, policing, and marking per port - Support egress queuing/scheduling
	9		Access Control Lists	- Access lists in hardware - Support for access lists source and destination L2 MAC address, Ethernet types, and SAPs - Support for access lists source and destination L3 addresses with masks and L4 port numbers - Support for prefix lists - Ability to apply L3 access list to L2 interfaces/ports - Ability to police (rate limit) per port, per port channel, per VLAN
	10		NTP Support	- Version 3 or greater: Required - Configurable NTP Peer and Server Associations - Configurable NTP Authentication - Configurable NTP Access Restrictions - Configurable Source IP Address for NTP packets - Configurable Timezone/Offset - Configurable automatic recurring daylight savings time - Configurable per Interface
	11		Cross-Stack Link Aggregation	Required: must be capable to support defining link aggregation across multiple switches within a stack.

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	12		Unidirectional Link failure detection	Required
	13		Port Mirroring or similar	Required
	14		Remote Port Mirroring or similar	Required
	15		Multi-chassis Management Interface Aggregation	Required
	16		Network Management	- Centralized AAA w/ Role Based Authorization, Syslog, SNMP v2c, v3, SNMP Traps, SSH, Telnet, Radius or similar - Ability to disable telnet, ftp, http, https - IPv6 Support - Secure console port with roles based AAA authentication - Configurable Console & VTY timeout - Ability to define and apply IP access control lists to VTY sessions - Out of Band Ethernet Management port-optional - DNS support for resolution of user-defined device names
	17		Message Logging Buffer	- Configurable log history size - Configurable logging severity - Configurable log message time stamps
	18		Data Traffic Rate Limiting	- Source and Destination IP - Layer 4 TCP and UDP - Source and Destination MAC
	19		VOIP Features	Configurable Voice-VLAN
	20		SNMP	- Support for SNMPv2C, & SNMPv3 - Support for traps that is an agent on the switch to send an unsolicited notifications to the SNMP manager for a configured event. - Configurable source IP address or interface for traps. - Supports both read-only (RO) and read-write (RW) community strings - Ability to restrict each community string to specific IP addresses independently - Ability to configure different SNMP versions for each SNMP manager - Support for multiple RO and RW community strings - Support for multiple SNMP profiles
	21		Required 802.1d Spanning Tree Features	- Must be able to disable spanning tree per port - Ability to transition immediately to forwarding state per port on edge ports with 802.1d/s/w - Ability to disable topology change notifications per port on edge ports with 802.1d/s/w - STP cost configurable per port (0 to 240) 802.1d & 802.1t - STP priority configurable per VLAN (0 to 61,440) 802.1d & 802.1t - Ability to prevent rogue bridges from becoming the STP root - Ability to prevent an alternate port or a root port from assuming a designated port role due to the absence of BPDUs. - Ability to configure STP edge ports to disable upon receiving a BPDU